COPY NO.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

EARTH RESOURCES LABORATORY

@

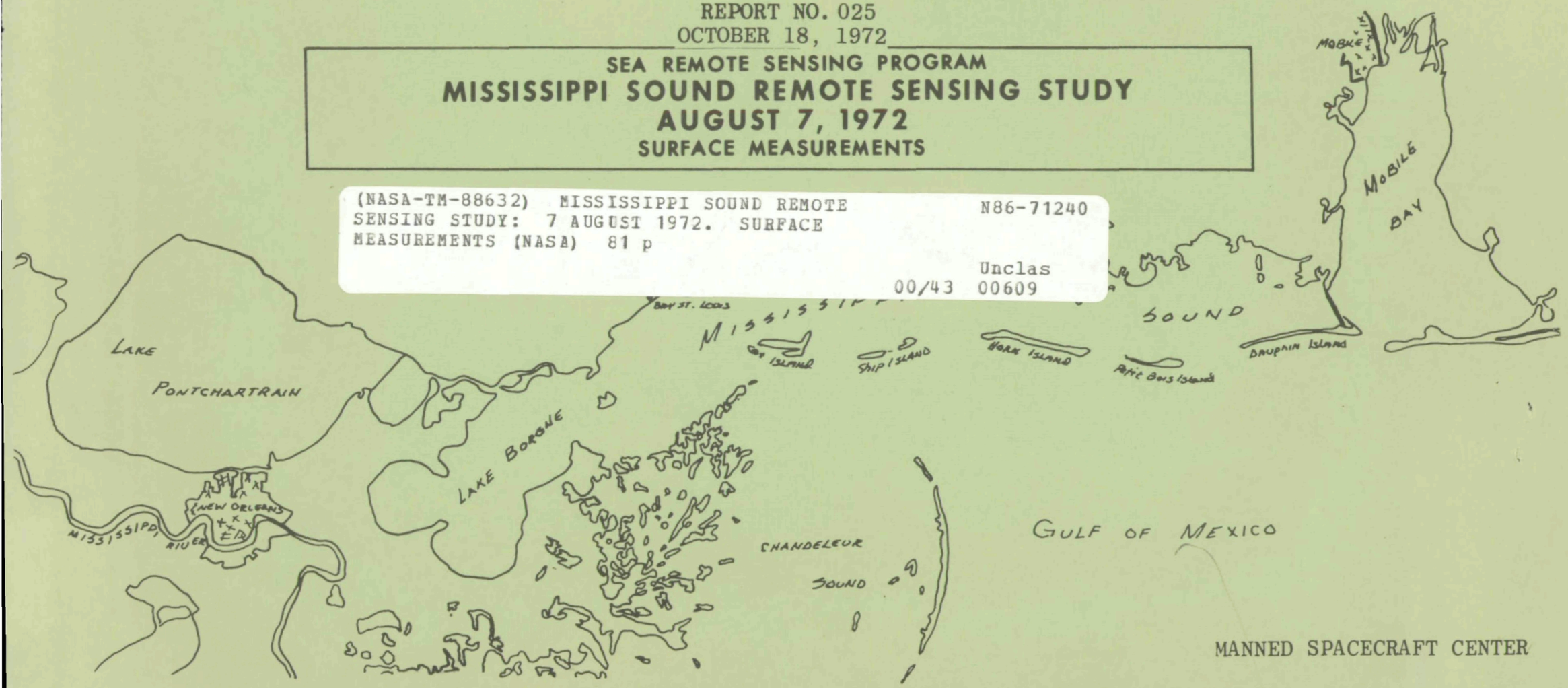
MTF

REPORT NO. 025
OCTOBER 18, 1972

SEA REMOTE SENSING PROGRAM

MISSISSIPPI SOUND REMOTE SENSING STUDY AUGUST 7, 1972

SURFACE MEASUREMENTS



MANNED SPACECRAFT CENTER

MISSISSIPPI SOUND VI REMOTE SENSING STUDY

PRINCIPAL INVESTIGATOR - DR. B. H. ATWELL

PARTICIPANTS

Alabama Department of Conservation
Gulf Coast Research Laboratory
National Marine Fisheries Service
U. S. Corps of Engineers-Mobile, Alabama

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF MAPS
(BACK POCKET)

INTRODUCTION

As a part of the remote sensing program of the NASA Earth Resources Laboratory (ERL), a study of the Mississippi Sound was initiated in early 1971. The first phase of this study consisted of four overflights by NASA aircraft with supporting surface measurements. Reports summarizing the surface data collected for each of the overflights- July 22, 1971, November 10, 1971, January 26, 1972 and May 2 and 4, 1972 have been published by the NASA Earth Resources Laboratory.

The study entered a second phase in participation with the National Marine Fisheries Service (NMFS) ERTS-A experiment #240[1] on July 6, 1972 in which additional scientific objectives have been included. One of the objectives is the assessment of the influences of physical parameters on the menhaden fishery within Mississippi Sound and in nearby waters of the Gulf of Mexico and how effectively these parameters may be measured remotely. The other is the inclusion of data obtained from the ERTS-A satellite in the evaluation of remote measurements. In addition to the direct support of the ERTS-A experiment, the ERL effort will also support an ongoing evaluation and demonstration of remote sensing techniques in the Mississippi Sound area emphasizing the measurement of a set of basic oceanographic parameters in coastal waters. The major parameters of interest are salinity, temperature, chlorophyll and turbidity.

This report includes the surface measurements made in support of the second "main day" overflight of the second phase of the study. The experiment was originally designed for the NASA NP3A aircraft. However, it did not fly because of instrumentation malfunction. A light aircraft leased by the NASA Earth Resources Laboratory collected infrared scanner, photographic and visible spectra radiometric measurements of the sea surface. A second light aircraft leased by the National Marine Fisheries Service collected color photography. The remotely sensed data collected will be reported separately. A complete list of publications reporting on previous experiments and other phases of this study may be found in Appendix A.

Because of the interest in the distribution of the menhaden fisheries throughout the Mississippi Sound the area was divided into five areas (A-E). Depending on the location of the fishing fleet a more dense set of surface measurements was planned to be made in one of

[1]Project Plan - ERTS-A Experiment dated July 21, 1972

these sections than the other four. Section E was choosen for this experiment. The mission was flown on August 7, 1972 the day of the ERTS-I overpass.

Surface and laboratory measurements made are recorded in Table 2.

These measurements were made and water samples collected by personnel from the list of participants shown on the cover page. Salinity and chlorophyll measurements were made by Lockheed Electronics Company personnel, support contractor to the Earth Resources Laboratory. Messrs. Jerry Brashier, James Halbach and Arthur Ralph Mason, Jr. of Lockheed Electronics Company compiled this report. The contour maps were drawn by Messrs. M. D. Furry, George W. Hampton and Ernst W. Zwart.

MATERIALS AND METHODS

Field Procedures

Field measurements and samples were taken at one-hundred and thirty seven stations in the Mississippi Sound on August 7, 1972 as ground truth for the mission (Table 1).

Each boat was assigned a certain section with a given number of stations to occupy in a serial manner. However, some of these stations were occupied twice during the exercise to allow some assessment of changes which took place during the day.

Surface water temperature measurements were made by taking a bucket sample and immediately immersing a mercury bulb thermometer in the center of the bucket of by using a bucket thermometer. Temperature and salinity measurements were made at a few stations with the RS5-3 salinometer and are listed in the remarks column Table 2.

Air temperature measurements were taken with mercury bulb thermometer as near the water surface as possible on the shady side of the boat.

Relative humidity values were determined with sling psychrometers.

Wind direction, wind speed, and sea state observations were in most cases estimated.

Water transparency was determined with secchi disks

Surface current speed and direction were measured at most stations. A neutrally buoyant float with minimum freeboard (partially filled plastic bottle) was attached to a 75 foot cord. The time required for the float to reach the end of the cord after being dropped from the anchored boat was measured. A velocity was computed by knowing the length of the cord and the elapsed time.

The time (CDT) of flyover for the Twin Beech aircraft on August 7, 1972 for each flight line was:

Line 5 - 08:32:01 - 08:59:07

Line 4 - 09:11:43 - 09:43:14

Line 3 - 09:55:42 - 09:32:15

Line E-6 - 14:26:58 - 14:32:23

Line E-5 - 14:35:52 - 14:42:05

Line E-4 - 14:43:37 - 14:49:38

Line C-2 - 15:03:33 - 15:12:14

Line 16 - 15:32:55 - 15·33:10

MATERIALS AND METHODS

Field Procedures (Cont'd)

National Weather Service Meteorological Observations are represented by Figures 1 and 2. Data from a radiosonde at Mississippi Test Facility on 6 July 1972 is shown in Figure 3.

Tide measurements recorded by the U. S. Corps of Engineers, Mobile, Alabama are shown in Figure 4

Data computations and listings for this mission were made with the Univac 1108.

Below is a nomenclature list.

Column	Abbreviation	Name
1	STAT NUMB	Station number
2	TIME CDT	Time Central Daylight
3	WATER TEMP DEG C	Water temperature degrees centigrade
4	CHLO PH A MG/M3	Chlorophyll A milligrams per cubic meter
5	SALNTY PTS/K	Salinity parts per thousand
6	AIR TEMP DG C	Air temperature degrees centigrade
7	RELAT HUMDY PERCT	Relative humidity percent
8	WIND DIR DEG	Wind direction degrees
9	WIND SPD KN	Wind speed knots
10	SECH VISB FT	Secchi Visibility Feet
11	SEA STAT FT	Sea station feet
12	CURRT KN	Current knots
13	CUR DIR DEG	Current direction degrees
14	WATER DEPTH FT	Water depth feet
15	BOTL NO.	Bottle number
16	REMARKS	Remarks

Printout of asterisks represent no available data.

Laboratory Procedures

Water samples were taken at each station in pint polypropylene bottles for chlorophyll and salinity analyses.

Salinities were run with a Beckman Model RS-7B Induction Salinometer. Standard (35 °/oo) sea water was used as reference, and salinities were determined from the conductivity ratio of the sample to that of the standard. Temperature and instrument drift corrections were made according to the Beckman Manual.

The technique used for determination of chlorophyll, which gives a measure of the phytoplankton present, was essentially that proposed by SCOR-UNESCO working group 17 in Determination of Photosynthetic Pigments in Sea-Water, UNESCO, Paris 1969. Each water sample for chlorophyll analysis was filtered through a millipore 0.45 micron acetate filter. The filters and their residue were stored at -15°C over activated silica gel. Each filter and its residue was ground in a teflon tissue grinder. Ninety percent acetone was used as the extracting agent. The acetone homogenates were stored in the dark for ten minutes, then centrifuged at 2000 g for approximately one hour instead of the recommended ten minutes because the extract was too turbid. The volume of each extract was recorded and the absorption spectrum of the chlorophyll extract measured against a blank acetate filter dissolved in 90% acetone. The measurements were made on a Cary 17 Spectrophotometer.

The absorption spectra were indexed at 750, 663, 645 and 630 mμ. The absorption at 663, 645 and 630 mμ was corrected by comparison with the absorption of the "reference blank" at 750 mμ. These corrected values are used in the following formula to determine chlorophyll A .

$$\text{chl } A = (11.64\, x_{e_{663}} - 2.16\, x_{e_{645}} + 0.10\, x_{e_{630}}) \times \frac{\text{ext (ml)}}{\text{vol (l)}} \times \frac{1}{\text{absorption cell light path (cm)}}$$

where e_{663} = absorption at 663 mμ

e_{645} = absorption at 645 mμ

e_{630} = absorption at 630 mμ

ext = extract volume

vol = volume of sample

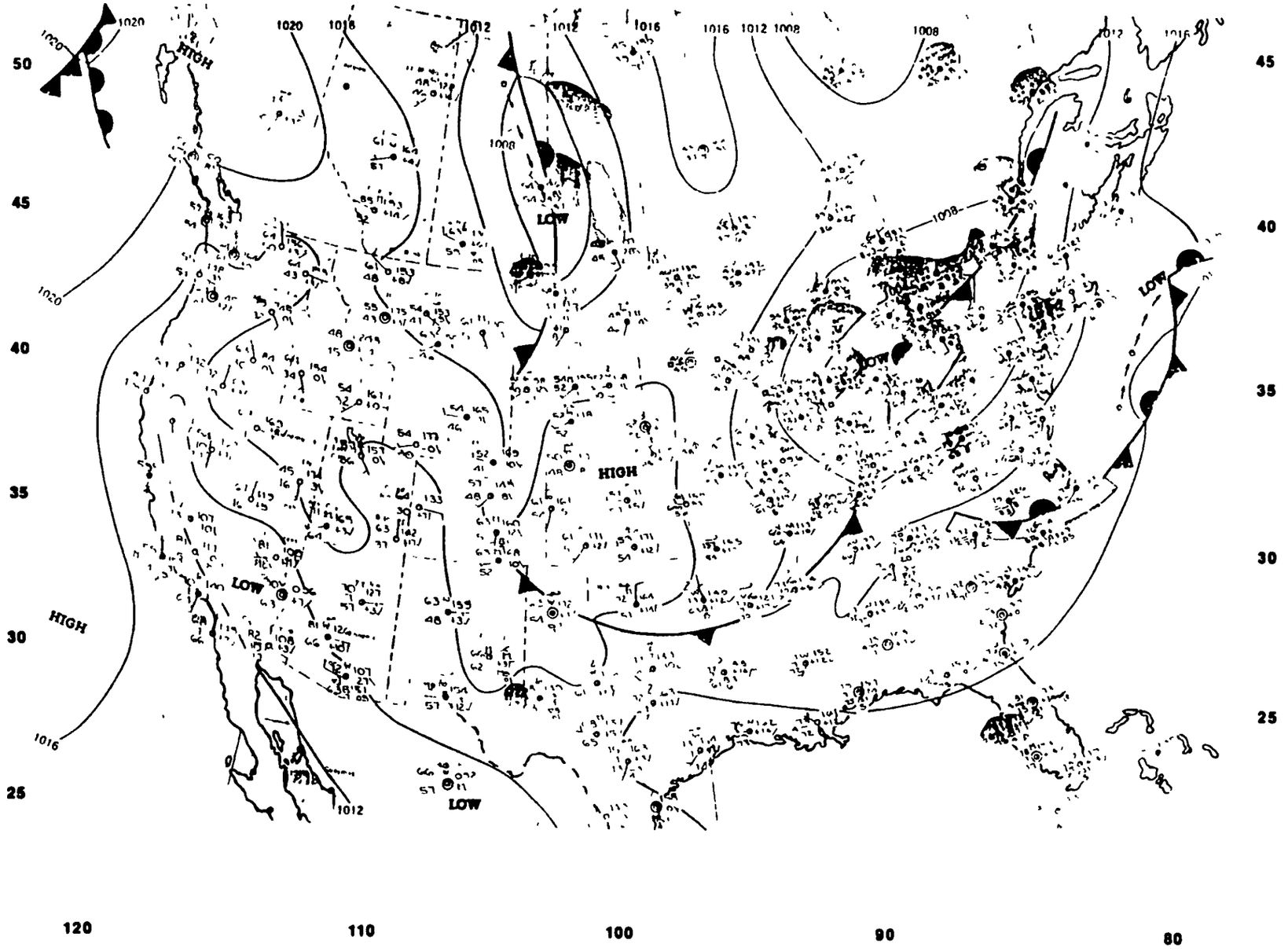
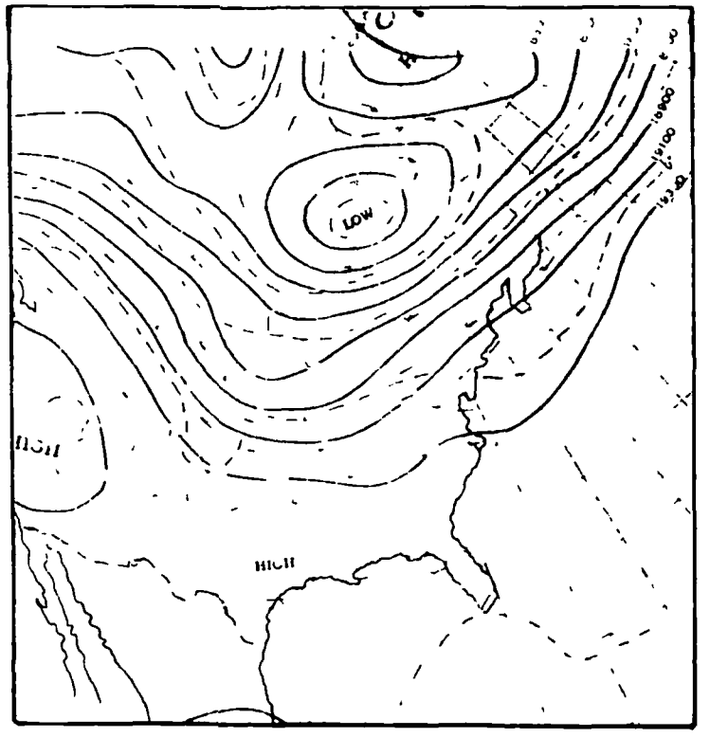
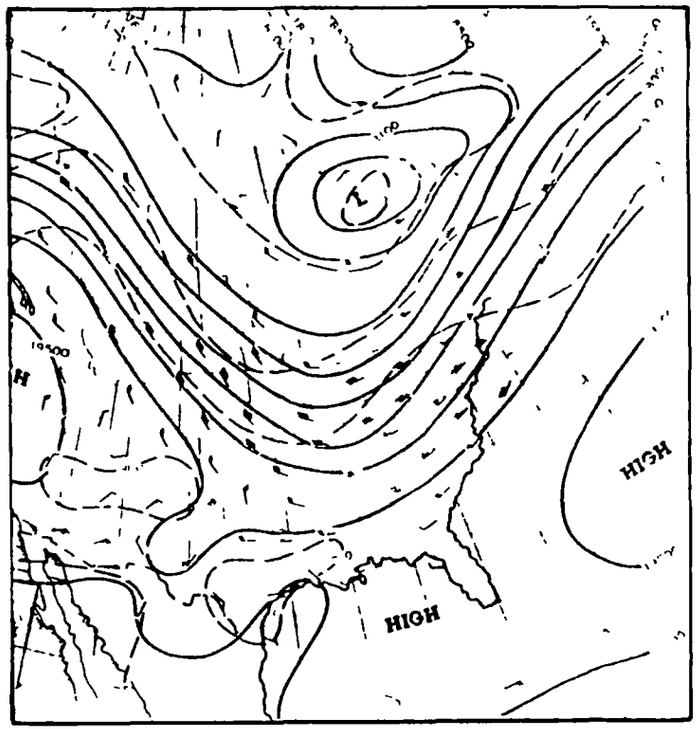


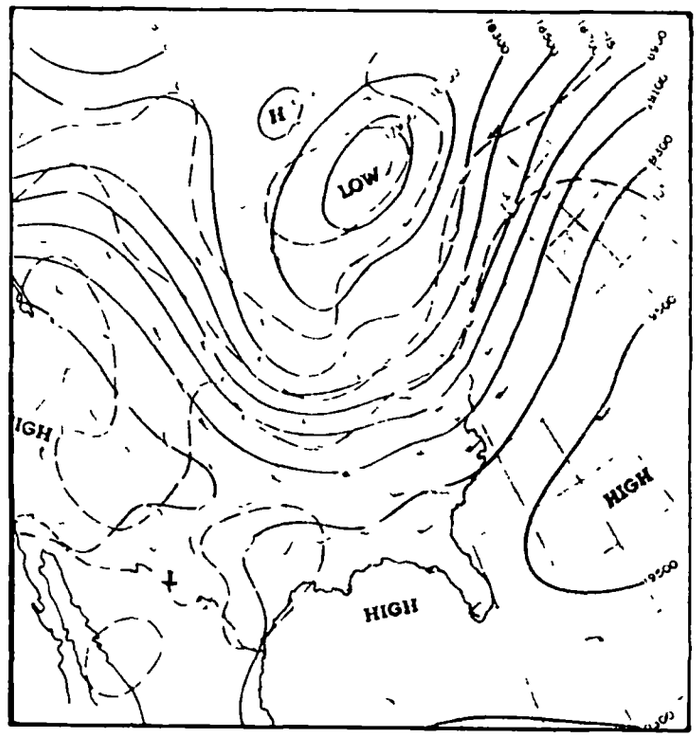
FIGURE 1. NATIONAL WEATHER SERVICE SURFACE WEATHER MAP AND STATION WEATHER AT 0000 GMT MONDAY, AUGUST 7, 1972



0000 GMT 6 AUGUST 1972



0000 GMT 7 AUGUST 1972



0000 GMT 8 AUGUST 1972

FIGURE 2. NATIONAL WEATHER SERVICE
500-MILLIBAR HEIGHT CONTOURS

PRESSURE	TEMP.	DEW POINT	HEIGHT
MILLIBARS	CENTIGRADE		METERS
1015.0	26.1	21.1	0
990.0	25.3	17.8	220
985.0	27.0	15.9	264
983.9	27.1	16.0	274
978.0	27.3	17.0	328
960.0	26.1	16.7	492
955.8	25.9	16.2	530
928.8	24.5	13.1	781
902.6	23.1	10.0	1032
877.0	21.8	6.9	1283
875.0	21.7	6.7	1304
865.0	21.0	8.4	1403
853.0	20.7	6.0	1524
833.0	20.1	2.0	1729
829.2	19.9	1.8	1767
804.4	18.1	.4	2023
780.4	16.4	-.9	2278
757.1	14.7	-2.3	2533
734.5	13.0	-3.7	2789
712.6	11.2	-5.1	3044
691.3	9.5	-6.5	3300
670.7	7.8	-7.9	3555

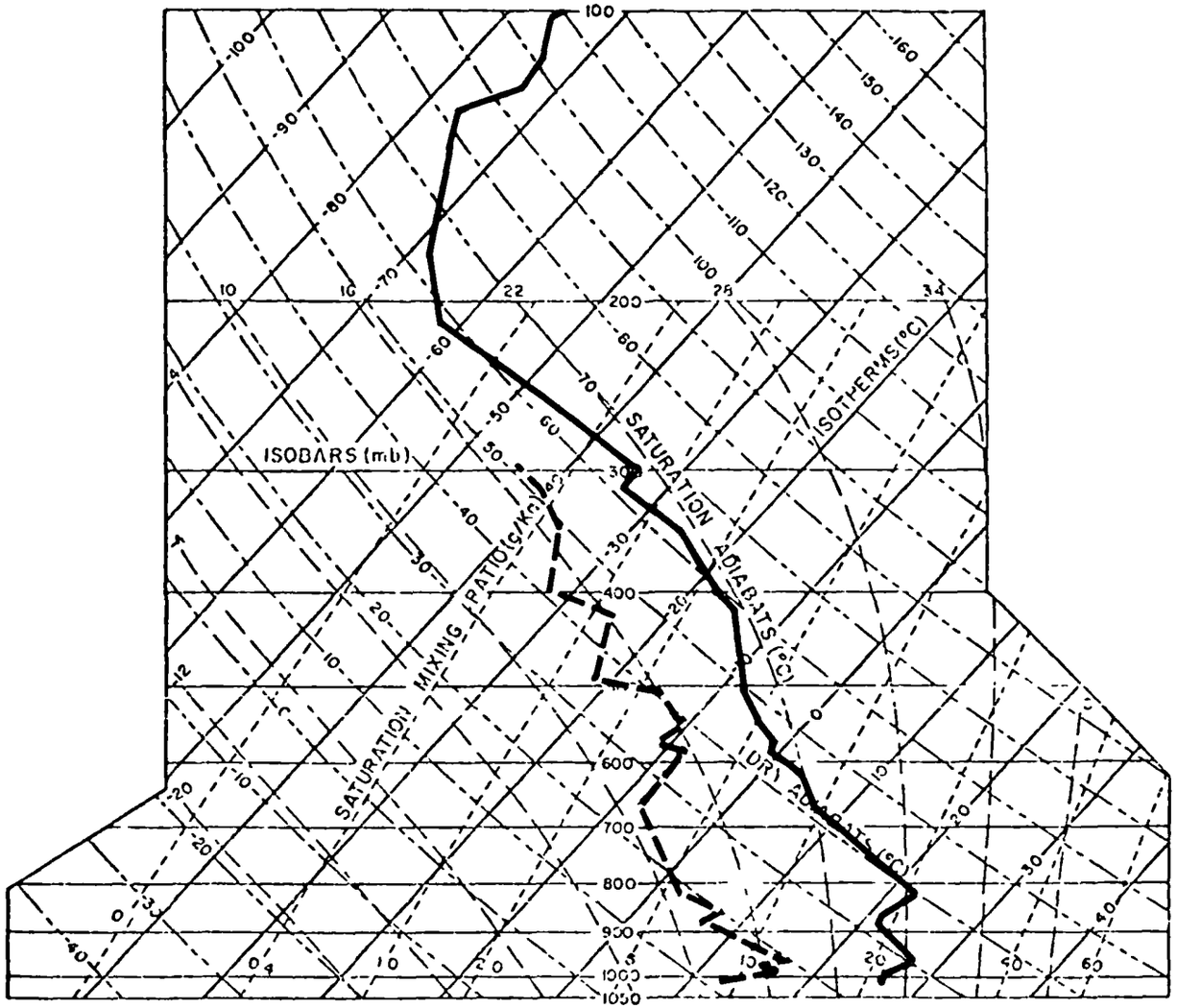
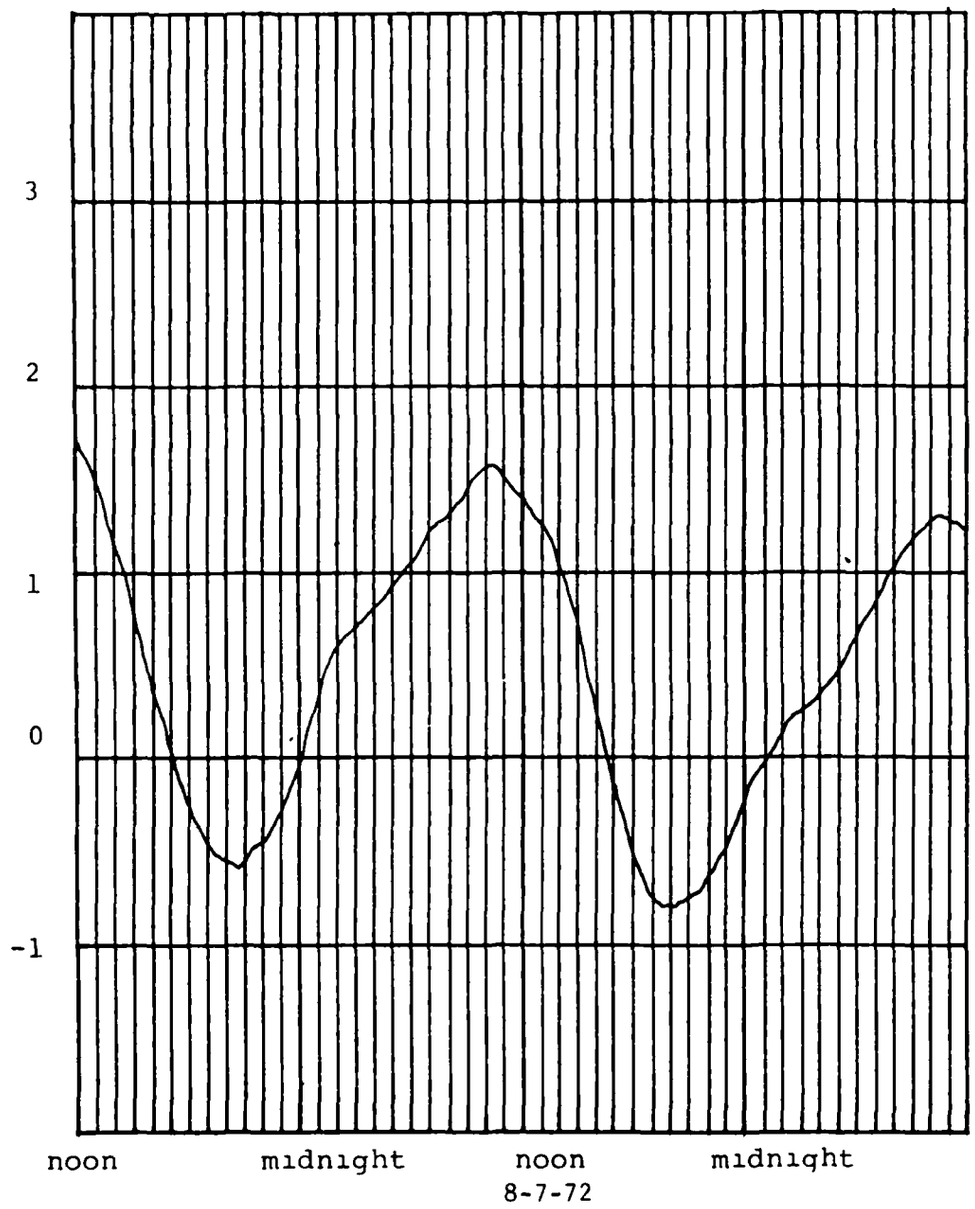
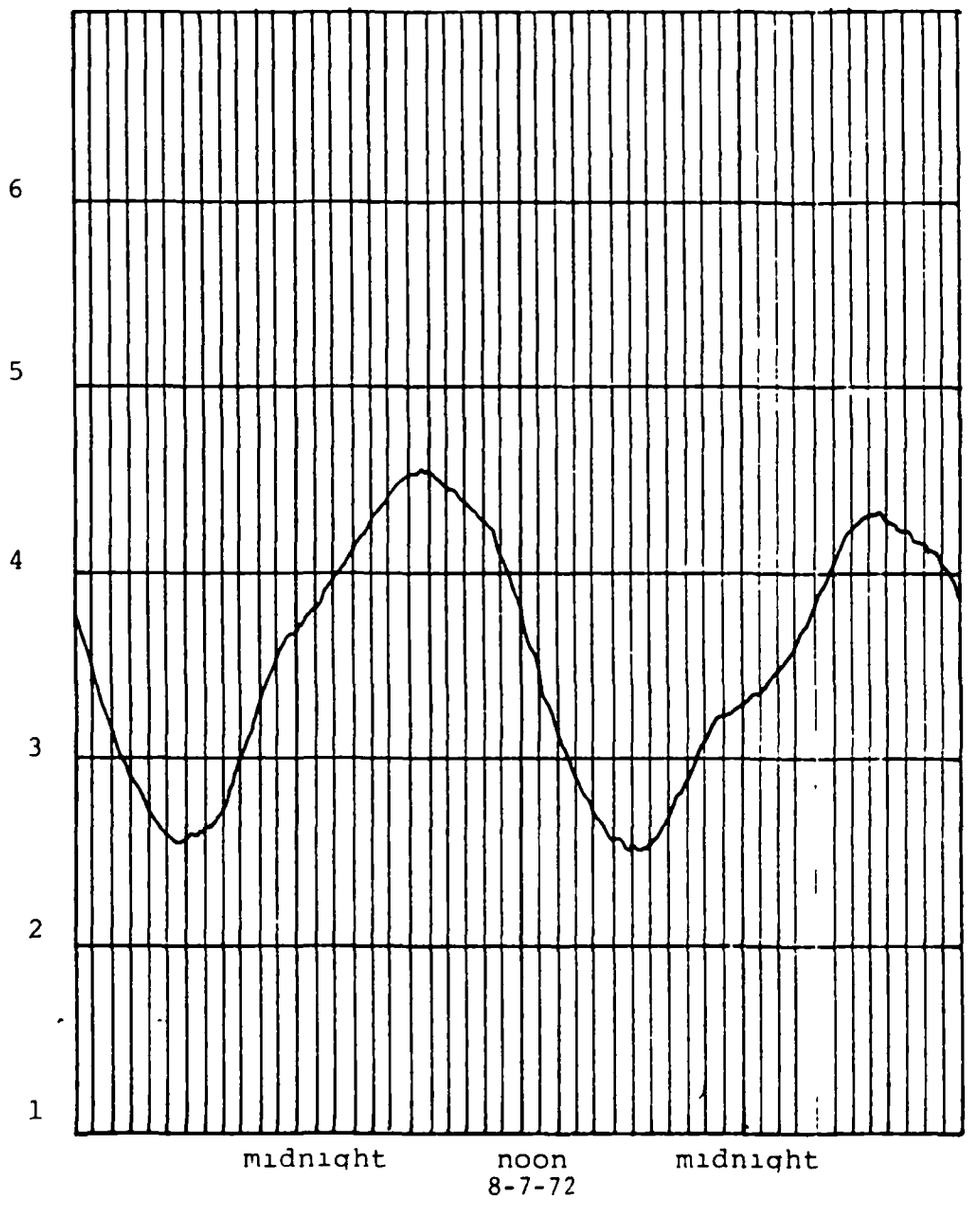


FIGURE 3. Machine processed radiosonde data available from Mississippi Test Facility 1337 GMT, 7 August 1972



GULFPORT, MISS.
GAGE ZERO
0.00 MSL



PASCAGOULA, MISS.
GAGE ZERO
3.11 MSL

FIGURE 4. GULFPORT & PASCAGOULA, MISS.
6, 7, 8 AUGUST 1972

(Source: Mobile Corps of Engineers)

TABLE 1

STATION LOCATIONS (See station map in back pocket)

Station	Location		Station	Location		Station	Location	
A-1	30°16'36"	89°21'04"	A-21	30°07'48"	89°09'37"	B-16	30°12'01"	89°00'26"
A-2	30°12'27"	89°21'04"	A-22	30°11'27"	89°09'37"	B-17	30°15'01"	89°00'26"
A-3	30°09'00"	89°21'04"	A-23	30°14'24"	89°09'37"	B-18	30°18'01"	89°00'26"
A-4	30°05'12"	89°21'04"	A-24	30°17'02"	89°09'37"	B-19	30°21'00"	89°00'26"
A-5	30°06'27"	89°18'48"	A-25	30°20'00"	89°09'37"	B-20	30°21'00"	88°57'59"
A-6	30°09'00"	89°18'48"	B-1	30°20'00"	89°07'19"	B-21	30°18'01"	88°57'59"
A-7	30°12'39"	89°18'48"	B-2	30°17'02"	89°07'19"	B-22	30°15'01"	88°57'59"
A-8	30°15'27"	89°18'48"	B-3	30°14'30"	89°07'19"	B-23	30°04'30"	88°55'44"
A-9	30°17'30"	89°16'32"	B-4	30°04'30"	89°04'56"	B-24	30°07'48"	88°55'44"
A-10	30°14'51"	89°16'32"	B-5	30°07'48"	89°04'56"	B-25	30°12'01"	88°55'44"
A-11	30°11'51"	89°16'32"	B-6	30°11'01"	89°04'56"	B-28	30°21'00"	88°55'44"
A-12	30°08'51"	89°16'32"	B-7	30°14'37"	89°04'56"	B-29	30°07'45"	89°02'41"
A-13	30°09'18"	89°14'09"	B-8	30°17'02"	89°04'56"	B-30	30°04'21"	89°02'41"
A-14	30°11'24"	89°14'09"	B-9	30°19'30"	89°04'56"	C-1	30°21'00"	88°53'27"
A-15	30°14'41"	89°14'09"	B-10	30°21'00"	89°02'41"	C-2	30°18'01"	88°53'27"
A-16	30°17'52"	89°14'09"	B-11	30°18'18"	89°02'41"	C-3	30°15'01"	88°53'27"
A-17	30°17'52"	89°11'54"	B-12	30°15'39"	89°02'41"	C-4	30°04'30"	88°51'12"
A-18	30°14'51"	89°11'54"	B-13	30°13'45"	89°02'41"	C-5	30°08'45"	88°51'12"
A-19	30°12'24"	89°11'54"	B-14	30°04'30"	89°00'26"	C-6	30°13'01"	88°51'12"
A-20	30°04'30"	89°09'37"	B-15	30°07'48"	89°00'26"	C-7	30°15'24"	88°51'12"

TABLE 1

STATION LOCATIONS

Station	Location		Station	Location		Station	Location	
C-8	30°18'01"	88°51'12"	D-1	30°20'00"	88°30'30"	D-21	30°13'14"	88°30'24"
C-9	30°21'00"	88°51'12"	D-2	30°17'00"	88°30'30"	D-22	30°04'30"	88°27'57"
C-13	30°04'30"	88°46'29"	D-3	30°14'36"	88°30'30"	D-23	30°07'48"	88°27'57"
C-14	30°08'46"	88°46'29"	D-4	30°04'30"	88°37'13"	D-24	30°11'28"	88°27'57"
C-15	30°13'01"	88°46'29"	D-5	30°08'46"	88°37'13"	D-25	30°12'43"	88°27'57"
C-16	30°15'00"	88°46'29"	D-6	30°13'01"	88°37'13"	D-26	30°15'43"	88°27'57"
C-17	30°18'01"	88°46'29"	D-7	30°15'04"	88°37'13"	D-27	30°18'42"	88°27'57"
C-18	30°21'00"	88°46'29"	D-8	30°17'00"	88°37'13"	D-28	30°12'00"	88°34'57"
C-19	30°18'30"	88°44'13"	D-9	30°20'00"	88°37'13"	D-29	30°08'45"	88°34'57"
C-20	30°17'12"	88°44'13"	D-10	30°19'42"	88°34'57"	D-30	30°04'30"	88°34'57"
C-21	30°15'18"	88°44'13"	D-11	30°16'43"	88°34'57"	E-1	30°18'42"	88°25'41"
C-22	30°04'30"	88°41'57"	D-12	30°13'42"	88°34'57"	E-2	30°15'43"	88°25'41"
C-23	30°08'46"	88°41'57"	D-13	30°04'30"	88°32'40"	E-3	30°12'43"	88°25'41"
C-24	30°13'01"	88°41'57"	D-14	30°08'45"	88°32'40"	E-4	30°04'30"	88°23'25"
C-25	30°15'29"	88°41'57"	D-15	30°12'30"	88°32'40"	E-5	30°07'48"	88°23'25"
C-26	30°18'01"	88°41'57"	D-16	30°13'42"	88°32'40"	E-6	30°11'28"	88°23'25"
C-27	30°20'00"	88°41'57"	D-17	30°16'43"	88°32'40"	E-7	30°12'43"	88°23'25"
C-28	30°14'09"	88°48'46"	D-18	30°19'42"	88°32'40"	E-8	30°15'43"	88°23'25"
C-29	30°11'00"	88°48'46"	D-19	30°17'54"	88°30'24"	E-9	30°18'42"	88°23'25"
C-30	30°04'30"	88°48'46"	D-20	30°16'12"	88°30'24"	E-10	30°20'24"	88°21'09"

TABLE 1

STATION LOCATIONS

Station	Location	
E-11	30°17'27"	88°21'09"
E-12	30°14'28"	88°21'09"
E-13	30°04'30"	88°18'54"
E-14	30°07'48"	88°18'54"
E-15	30°11'28"	88°18'54"
E-16	30°14'28"	88°18'54"
E-17	30°17'27"	88°18'54"
E-18	30°20'24"	88°18'54"
E-19	30°20'24"	88°16'39"
E-20	30°17'27"	88°16'39"
E-21	30°14'28"	88°16'39"
E-22	30°12'43"	88°21'05"
E-23	30°07'48"	88°21'09"
E-24	30°15'54"	88°14'30"
E-25	30°18'56"	88°14'30"
E-26	30°21'57"	88°14'30"
E-27	30°04'30"	88°21'09"

TABLE 2

MISSISSIPPI SOUND VI

FIELD AND LABORATORY MEASUREMENTS

STAT NUMB	TIME CDT	WATER TEMP DEG C	CHLO PH A MG/M3	SALNTY PTS/K	AIR TEMP DG C	RELAT HUMDY PERCT	WIND DIR DEG	WIND SPD KN	SECH VISB FT	SEA STAT FT	CURRT KN	CUR DIR DEG	WATER DEPTH FT	BOTL NO.	REMARKS
A1	830	30.3	2.2	18.85	27.5	60.5	270	8	3.0	1.0	.36	240	10.0	1	
A2	930	30.5	3.0	19.78	28.0	63.3	270	8	3.0	1.0	.20	240	12.0	2	
A3	1000	30.9	1.2	20.87	27.9	61.3	270	8	3.5	1.0	.20	240	12.0	3	
A4	1025	30.8	2.8	19.15	31.0	53.6	270	10	4.0	1.5	.34	250	12.0	4	
A5	1100	31.0	1.9	22.84	31.3	52.7	260	8	3.5	1.5	.25	210	12.0	5	
A5	1550	31.5	3.5	21.34	29.7	60.5	250	10	5.5	1.5	.81	90	12.0	12	
A6	1130	31.5	.9	23.31	30.5	56.0	270	8	5.0	1.0	.33	180	12.0	6	
A6	1660	31.5	3.0	22.51	32.0	61.3	250	10	5.5	1.5	.89	70	12.0	14	
A7	1150	31.0	3.1	21.71	33.1	53.6	270	8	4.5	1.0	.25	180	12.0	7	
A7	1635	31.0	2.0	20.82	29.8	67.3	250	10	5.0	1.5	.59	90	12.0	15	
A8	1300	30.8	2.4	19.50	31.2	53.6	210	6	5.0	.5	.42	90	12.0	8	
A8	1720	31.3	3.7	19.12	31.5	59.0	225	12	1.5	1.5	.40	50	6.0	16	
A9	1330	31.1	6.1	17.81	31.5	59.4	180	10	6.0	.5	.33	90	8.0	9	
A10	1430	30.6	2.6	19.17	31.7	58.6	240	11	6.0	1.0	.59	90	6.0	10	
A11	1500	31.4	2.1	22.28	29.9	64.4	240	14	5.5	2.0	.74	70	12.0	11	
A12	1520	31.6	3.3	24.25	31.5	64.1	250	10	5.5	1.5	.99	70	12.0	12	

TABLE 2

MISSISSIPPI SOUND VI

FIELD AND LABORATORY MEASUREMENTS

STAT UMB	TIME CDT	WATER TEMP DEG C	CHLO PH A MG/M3	SALNTY PTS/K	AIR TEMP DG C	RELAT HUMDY PERCT	WIND DIR DEG	WIND SPD KN	SECH VISB FT	SEA STAT FT	CURRT KN	CUR DIR DEG	WATER DEPTH FT	BOTL NO.	REMARKS RS5-3 Temp.	Sal.
13	1045	30.0	4.5	23.79	29.0	29.7	270	9	2.0	*****	*****	***	10.0	167		
14	1030	30.0	3.9	23.44	31.0	34.5	270	10	2.5	*****	*****	***	8.0	163		
15	930	29.5	3.9	24.90	29.0	62.9	270	7	1.5	*****	*****	***	25.0	166		
16	830	29.5	3.5	19.27	29.0	69.7	270	7	1.5	*****	*****	***	10.0	21		
17	1115	31.0	2.4	23.35	29.5	41.6	270	9	2.5	*****	*****	***	11.0	165		
17	1130	31.0	3.8	23.35	29.5	56.0	90	9	2.5	*****	*****	***	11.0	164		
19	1145	32.5	2.8	23.21	29.5	64.7	235	10	2.0	*****	*****	***	15.0	168		
19	1155	31.0	1.5	23.11	30.0	85.0	235	10	2.0	*****	*****	***	15.5	170		
20	955	31.1	5.0	28.01	32.5	64.4	270	8	6.0	2.5	*****	***	15.0	153	31.1	28.5
21	910	30.8	2.5	28.35	29.3	63.7	270	8	6.0	2.5	.74	270	16.0	152	30.5	29.0
22	830	30.3	4.2	28.13	29.0	69.1	270	8	****	2.0	*****	***	7.0	151	30.5	21.2
23	1220	31.5	2.2	22.66	30.0	61.3	235	10	2.5	*****	*****	***	14.0	169		
24	1300	31.0	4.2	19.04	30.0	45.3	235	8	2.5	*****	*****	***	12.0	171		
25	1400	30.0	2.6	19.00	30.0	44.8	235	8	2.5	*****	*****	***	12.0	173		
1	830	30.2	3.6	21.51	30.5	59.2	290	4	3.0	1.0	.21	270	8.5	33		
2	921	30.2	3.9	******	30.6	60.1	290	4	4.0	2.0	.30	270	14.0	34		

TABLE 2

MISSISSIPPI SOUND VI

FIELD AND LABORATORY MEASUREMENTS

STAT NUMB	TIME CDT	WATER TEMP DEG C	CHLO PH A MG/M3	SALNTY PTS/K	AIR TEMP DG C	RELAT HUMDY PERCT	WIND DIR DEG	WIND SPD KN	SECH VISB FT	SEA STAT FT	CURRT KN	CUR DIR DEG	WATER DEPTH FT	BOTL NO.	REMARKS RS5-3 Temp.	REMARKS RS5-3 Sal.
B3	954	30.6	4.4	23.80	30.4	56.9	290	4	4.5	2.0	.11	300	8.0	35		
B4	1025	****	2.9	29.52	33.2	87.5	270	6	6.0	2.0	*****	***	10.0	154	30.4	30.0
B5	1055	****	2.2	29.80	32.0	64.1	270	6	10.0	2.0	*****	***	14.0	155	30.4	30.2
B6	1110	****	2.4	30.53	31.2	61.6	270	6	****	2.0	*****	***	13.0	156	30.7	30.8
B7	1037	30.6	4.4	24.15	31.1	57.8	280	3	3.5	2.0	.10	80	9.0	36		
B7	1343	31.1	4.1	24.20	32.0	58.6	250	7	4.0	2.0	.56	70	9.0	42		
B8	1115	30.8	2.4	25.03	31.1	58.2	290	4	4.5	2.0	.33	190	14.0	37		
B8	1411	31.2	1.9	24.93	32.6	58.6	260	5	5.3	2.0	.50	110	14.0	43		
B9	1137	30.8	3.4	24.92	31.5	53.1	290	3	4.5	2.0	.27	150	9.0	38		
B9	1435	30.8	2.5	23.87	32.4	61.6	250	6	5.8	2.0	.68	100	9.0	44		
B10	1205	30.8	8.3	24.42	32.5	50.3	250	5	3.5	2.0	.23	70	9.0	39		
B11	1237	30.9	1.4	25.97	31.9	58.6	250	4	5.3	2.0	.52	185	25.0	40		
B12	1308	30.7	2.5	28.58	31.8	53.1	270	5	6.0	2.0	.56	110	12.0	41		
B13	1245	****	2.1	30.44	32.0	64.4	270	6	12.0	1.0	*****	***	12.0	162	31.1	30.8
B14	1200	****	2.0	31.01	32.5	56.4	270	6	6.0	1.5	*****	***	15.0	159	30.7	31.2
B15	1145	****	2.0	31.31	31.0	55.6	270	6	12.0	1.0	*****	***	24.0	158	30.6	31.4

TABLE 2

MISSISSIPPI SOUND VI

FIELD AND LABORATORY MEASUREMENTS

STAT NUMB	TIME CDT	WATER TEMP DEG C	CHLO PH A MG/M3	SALNTY PTS/K	AIR TEMP DG C	RELAT HUMDY PERCT	WIND DIR DEG	WIND SPD KN	SECH VISB FT	SEA STAT FT	CURRT KN	CUR DIR DEG	WATER DEPTH FT	BOTL NO.	REMARKS RS5-3 Temp.	Sal.
B16	1130	••••	2.5	30.87	30.5	58.6	270	6	10.0	1.0	•••••	•••	25.0	157	30.4	31.1
B17	920	29.9	2.9	30.55	33.2	60.9	300	6	6.0	2.5	.26	60	16.0	49		
B18	855	30.0	3.0	28.64	33.3	66.6	290	6	5.0	2.0	.23	290	12.0	51		
B19	830	30.2	2.4	26.72	33.1	63.7	290	6	5.5	2.0	.20	290	11.0	56		
B20	1050	30.5	2.7	27.34	33.3	60.9	280	3	6.0	1.0	.14	60	11.0	53		
B21	1017	30.5	2.5	26.59	33.3	67.3	305	3	5.0	1.0	.19	60	13.0	55		
B22	952	30.5	1.7	30.65	33.4	67.3	310	5	4.5	2.0	.27	60	16.0	54		
B23	945	30.6	2.2	30.68	32.1	67.9	240	12	12.0	1.0	•••••	•••	35.0	23		
B24	905	31.0	1.3	30.05	31.5	77.3	240	12	14.0	.8	.31	230	38.0	24		
B25	830	30.0	1.1	*****	30.2	84.0	240	10	14.0	.8	•••••	•••	18.0	25		
B29	1220	••••	2.8	30.53	31.9	56.4	270	6	11.0	1.0	•••••	•••	18.0	161	30.5	30.8
B30	1210	••••	2.0	30.16	31.8	56.0	270	6	10.0	1.0	•••••	•••	11.0	160	31.5	30.5
C1	1317	31.1	2.3	26.92	34.9	64.7	245	3	5.0	1.5	.56	70	11.0	52		
C2	1255	30.9	1.9	29.96	34.5	71.2	245	3	7.0	1.5	.59	80	13.0	46		
C3	1233	30.7	2.0	28.04	34.5	67.6	245	3	8.5	1.5	.40	95	17.0	45		
C4	1015	30.4	1.1	30.74	31.6	74.0	305	13	14.0	1.0	•••••	•••	43.0	4		

TABLE 2

MISSISSIPPI SOUND V I

FIELD AND LABORATORY MEASUREMENTS

STAT NUMB	TIME CDT	WATER TEMP DEG C	CHLO PH A MG/M3	SALNTY PTS/K	AIR TEMP DG C	RELAT HUMDY PERCT	WIND DIR DEG	WIND SPD KN	SECH VISB FT	SEA STAT FT	CURRT KN	CUR DIR DEG	WATER DEPTH FT	BOTL NO.	REMARKS
C5	1045	30.4	2.2	*****	32.4	70.6	325	13	12.0	1.0	*****	***	35.0	5	
C6	1105	30.6	1.4	30.44	32.6	67.6	330	12	14.0	1.0	*****	***	30.0	6	
C7	1213	30.8	1.4	28.09	34.3	61.3	250	3	8.5	1.5	.47	120	13.0	47	
C7	1448	30.8	*****	*****	34.1	80.5	240	5	6.5	2.0	*****	***	18.0		
C8	1152	30.7	2.2	27.85	33.9	64.4	260	2	5.5	1.0	.49	95	13.0	50	
C8	1426	31.0	*****	*****	33.9	70.6	240	5	4.5	2.0	*****	***	16.0		
C9	1127	30.9	3.2	20.01	33.3	61.3	240	2	5.0	1.0	.21	120	11.0	48	
C9	1414	30.9	*****	*****	33.9	74.3	230	5	4.0	2.0	*****	***	12.0		
C13	1210	30.8	1.2	31.26	32.3	71.2	300	10	>14.0	.8	*****	***	42.0	13	
C14	1150	30.3	1.0	30.41	32.2	77.5	300	12	14.0	1.0	*****	***	40.0	14	
C15	1130	30.3	1.0	30.33	32.4	67.6	330	12	12.0	1.0	*****	***	18.0	15	
C16	1000	29.4	1.4	30.66	34.0	63.7	260	6	10.5	1.0	.89	95	24.0	95	
C17	920	29.5	1.4	27.60	30.5	60.5	280	6	7.0	1.0	.70	115	12.0	94	
C18	830	29.1	7.0	25.02	29.0	66.3	290	6	1.5	1.0	.14	70	10.0	93	
C19	1135	30.6	5.8	26.35	32.5	55.6	265	5	1.5	1.0	.49	90	7.0	98	
C19	1420	31.0	6.4	26.34	33.1	59.0	235	8	1.0	1.0	.36	115	6.5	104	

TABLE 2

MISSISSIPPI SOUND VI

FIELD AND LABORATORY MEASUREMENTS

STAT NUMB	TIME CDT	WATER TEMP DEG C	CHLO PH A MG/M3	SALNTY PTS/K	AIR TEMP DG C	RELAT HUMDY PERCT	WIND DIR DEG	WIND SPD KN	SECH VISB FT	SEA STAT FT	CURNT KN	CUR DIR DEG	WATER DEPTH FT	BOTL NO.	REMARKS
C20	1055	30.5	2.0	26.98	31.7	52.7	285	6	8.0	1.0	.68	105	9.5	97	
C20	1355	31.2	4.4	26.59	32.0	55.6	250	7	4.0	1.0	.99	115	9.5	103	
C21	1023	29.5	1.0	30.64	31.4	60.5	280	6	10.0	1.0	.77	90	10.5	96	
C21	1327	30.2	1.9	29.54	32.0	58.6	260	6	8.5	1.0	.59	115	11.0	102	
C22	1000	30.0	*****	******	32.0	73.2	315	10	12.0	*****	*****	***	58.0	177	
C23	915	29.5	*****	******	30.0	70.0	315	10	12.0	*****	*****	***	52.0	176	
C24	830	29.0	1.2	30.35	31.0	66.6	315	7	12.0	*****	*****	***	31.0	175	
C25	1305	30.4	*****	30.62	31.9	58.6	280	6	5.0	1.0	.66	90	8.0	101	
C26	1240	30.9	3.0	27.61	32.6	61.3	255	5	5.0	1.0	.99	90	12.0	100	
C27	1215	30.9	8.8	25.15	32.9	58.6	255	5	1.5	1.0	.42	90	6.5	99	
C28	1400	30.5	1.9	30.40	33.9	68.2	210	10	12.0	.8	*****	***	20.0	28	
C29	1320	30.7	1.4	30.58	34.0	68.2	270	10	>14.0	.8	*****	***	40.0	29	
C30	1225	30.9	1.2	30.96	32.6	67.6	270	10	>14.0	.8	*****	***	45.0	30	
D1	830	29.5	10.0	26.61	28.5	72.9	270	6	3.0	.5	.25	90	8.0	67	
D2	855	30.0	5.3	28.21	28.6	72.9	270	8	3.5	1.0	*****	***	14.0	68	
D3	910	29.5	1.9	29.59	29.4	70.0	270	8	7.0	1.0	*****	***	17.0	58	

TABLE 2

MISSISSIPPI SOUND VI
FIELD AND LABORATORY MEASUREMENTS

STAT NUMB	TIME CDT	WATER TEMP DEG C	CHLO PH A MG/M3	SALNTY PTS/K	AIR TEMP DG C	RELAT HUMDY PERCT	WIND DIR DEG	WIND SPD KN	SECH VISB FT	SEA STAT FT	CURRT KN	CUR DIR DEG	WATER DEPTH FT	BOTL NO.	REMARKS
D4	1025	29.5	.8	32.52	31.5	70.0	315	10	12.0	*****	*****	***	60.0	178	
D5	1350	30.5	.5	31.48	32.5	*****	315	10	12.0	*****	*****	***	47.0	186	
D6	1335	30.5	1.1	31.37	32.5	*****	315	10	12.0	*****	*****	***	36.0	185	
D7	930	29.6	2.1	29.02	29.8	72.9	270	8	5.0	1.0	*****	***	14.0	63	
D7	1210	30.5	2.4	28.93	29.8	54.0	270	8	7.0	1.0	*****	***	13.0	62	
D8	950	30.0	4.5	28.23	30.1	66.6	280	8	2.5	1.0	*****	***	12.0	65	
D8	1225	30.5	2.4	28.72	30.2	67.0	270	8	4.0	1.0	*****	***	11.0	58	
D9	1005	30.4	4.7	24.42	31.0	60.5	270	6	2.5	.5	*****	***	7.0	57	
D9	1240	31.2	7.2	25.32	30.5	64.7	270	8	2.0	1.0	*****	***	6.0	61	
D10	1017	30.5	2.9	25.65	31.5	58.6	270	6	2.0	.5	*****	***	6.0	66	
D11	1035	30.3	2.2	27.63	31.0	64.1	270	8	4.0	1.0	*****	***	8.0	60	
D12	1050	29.9	1.9	27.52	31.8	64.1	300.	8	10.0	1.0	*****	***	22.0	64	
D13	1120	29.0	.6	34.81	31.5	70.0	315	10	12.0	*****	*****	***	65.0	180	
D14	1305	31.0	.8	30.92	32.5	*****	315	10	12.0	*****	*****	***	41.0	182	
D15	1315	30.0	1.9	28.80	32.5	*****	315	10	12.0	*****	*****	***	25.0	183	
D16	920	29.1	2.3	27.84	31.8	70.0	290	9	10.0	1.0	.42	120	15.0	75	

TABLE 2

MISSISSIPPI SOUND VI

FIELD AND LABORATORY MEASUREMENTS

STAT NUMB	TIME CDT	WATER TEMP DEG C	CHLO PH A MG/M3	SALNTY PTS/K	AIR TEMP DG C	RELAT HUMDY PERCT	WIND DIR DEG	WIND SPD KN	SECH VISB FT	SEA STAT FT	CURNT KN	CUR DIR DEG	WATER DEPTH FT	BOTL NO.	REMARKS
D17	855	29.2	2.0	27.79	30.1	72.9	315	6	7.5	1.0	.30	145	15.0	69	
D18	825	28.4	6.9	22.47	29.0	69.1	315	6	3.5	.5	.21	145	7.0	71	
D19	1020	29.5	6.8	24.89	31.0	70.0	290	3	4.0	.5	.49	120	11.0	77	
D19	1310	28.5	11.4	24.54	31.0	63.3	225	10	3.5	1.0	.49	120	11.0	73	
D20	1000	29.0	3.1	27.61	32.0	60.9	290	6	8.0	1.0	.30	120	20.0	70	
D20	1225	30.2	5.1	25.49	31.5	64.1	225	10	5.0	1.0	.21	210	16.0	74	
D21	935	29.5	1.7	30.85	31.6	70.0	290	12	11.0	1.0	*****	***	20.0	79	
D21	1150	29.5	1.1	28.02	31.0	70.6	270	7	>12.0	1.5	.25	135	20.0	72	
D22	1000	30.2	.5	32.09	32.8	70.6	310	14	>12.0	2.5	*****	***	*****	196	
D23	935	30.0	.8	30.98	30.2	70.3	310	12	>12.0	2.0	.56	120	*****	197	
D24	920	29.8	1.3	31.26	30.3	70.0	310	12	>12.0	1.5	*****	***	*****	198	
D25	1120	27.4	1.2	30.82	29.6	72.9	270	7	9.5	1.5	.11	120	14.0	80	
D26	1055	27.8	1.3	28.24	30.0	70.0	270	4	7.0	1.5	.30	150	16.0	78	
D27	1035	28.5	11.1	28.54	31.0	70.0	270	4	3.0	.5	.16	90	5.0	76	
D28	1325	30.0	.9	31.04	32.5	*****	315	10	12.0	*****	*****	***	36.0	184	
D29	1245	30.5	*****	******	32.5	*****	315	10	12.0	*****	*****	***	45.0	181	

TABLE 2

MISSISSIPPI SOUND VI

FIELD AND LABORATORY MEASUREMENTS

STAT NUMB	TIME CDT	WATER TEMP DEG C	CHLO PH A MG/M3	SALNTY PTS/K	AIR TEMP DG C	RELAT HUMDY PERCT	WIND DIR DEG	WIND SPD KN	SECH VISB FT	SEA STAT FT	CURRT KN	CUR DIR DEG	WATER DEPTH FT	BOTL NO.	REMARKS
D30	1040	29.5	.9	32.99	31.2	70.0	315	10	12.0	*****	*****	***	62.0	179	
E1	835	30.1	*****	******	30.2	73.8	270	4	6.0	1.0	.26	135	12.0	114	
E1	1130	30.5	3.7	±29.21	31.1	64.7	270	4	5.0	.5	.74	135	12.0	109	
E2	917	30.0	*****	******	28.8	70.0	270	5	6.0	1.0	.63	90	12.0	115	
E2	1200	30.7	2.0	29.08	30.0	61.3	270	6	6.0	1.0	.74	110	18.0	105	
E3	945	29.6	*****	******	29.0	67.0	295	8	6.0	1.5	.54	45	8.0	116	
E3	1225	29.8	1.9	30.80	30.0	58.6	270	7	8.0	.5	.99	90	10.0	110	
E4	1020	29.8	1.0	30.95	31.2	67.6	310	12	> 12.0	2.0	*****	***	*****	195	
E7	1240	30.5	*****	******	30.4	58.6	270	8	6.0	1.5	1.27	90	10.0	107	
E5	1035	29.8	1.2	31.03	30.8	67.3	310	12	> 12.0	2.0	*****	***	*****	191	
E6	1050	29.6	.8	31.09	31.1	64.4	310	12	> 12.0	2.0	*****	***	*****	189	
E7	1015	29.9	1.8	28.72	29.2	64.1	295	8	8.0	1.5	.63	90	10.0	111	
E8	1040	30.2	1.9	29.72	30.5	61.3	295	8	8.0	1.0	.74	90	20.0	112	
E8	1300	30.9	*****	******	30.5	61.6	270	8	8.0	1.5	.74	90	19.0	108	
E9	1110	30.5	*****	30.57	30.8	61.3	270	4	8.0	.5	.74	135	14.0	113	
E9	1320	30.8	*****	******	30.5	61.6	270	8	****	1.0	.74	90	16.0		

TABLE 2

MISSISSIPPI SOUND VI

FIELD AND LABORATORY MEASUREMENTS

STAT NUMB	TIME CDT	WATER TEMP DEG C	CHLO PH A MG/M3	SALNTY PTS/K	AIR TEMP DG C	RELAT HUMDY PERCT	WIND DIR DEG	WIND SPD KN	SECH VISB FT	SEA STAT FT	CURNT KN	CUR DIR DEG	WATER DEPTH FT	BOTL NO.	REMARKS
E10	912	30.2	5.1	28.31	31.1	63.7	320	6	5.0	1.0	.24	140	11.0	139	
E10	1225	30.5	3.1	28.02	31.8	61.3	240	8	5.5	1.5	.25	130	11.0	148	
E11	1150	30.2	2.5	29.85	31.5	61.3	270	6	8.0	2.0	.18	150	17.0	147	
E11	1415	30.5	1.4	29.92	31.4	61.6	280	8	8.5	2.0	.18	150	17.0	144	
E12	1130	30.1	1.5	30.41	31.4	58.6	320	6	10.0	2.0	.25	120	18.0	143	
E12	1400	30.3	2.0	30.49	31.1	61.3	320	8	10.0	2.0	.25	120	18.0	145	
E13	1140	29.8	.9	30.50	32.1	67.3	310	12	>12.0	2.0	*****	***	*****	193	
E14	1125	29.6	1.2	30.96	31.5	70.3	310	10	>12.0	2.5	*****	***	*****	192	
E15	1110	29.5	1.3	31.38	32.5	61.6	310	10	>12.0	2.5	*****	***	*****	188	
E16	1100	29.8	5.2	30.44	30.9	58.6	320	7	4.0	2.0	.44	270	16.0	140	
E16	1435	30.5	*****	******	31.0	61.3	****	****	****	2.5	*****	***	16.0		
E16	1340	30.1	5.2	28.98	31.1	61.6	230	8	4.0	2.0	.42	135	16.0	149	
E17	1020	30.3	2.3	27.99	32.2	61.3	305	7	7.0	1.5	.24	130	15.0	141	
E17	1310	30.6	1.9	29.94	31.7	61.6	240	8	7.5	2.0	.25	130	15.0	146	
E17	1445	30.9	*****	******	31.5	61.3	****	****	****	2.5	*****	***	15.0		
E18	950	30.2	3.2	28.30	31.8	61.3	320	6	5.5	1.0	.25	95	12.0	142	

TABLE 2

MISSISSIPPI SOUND VI

FIELD AND LABORATORY MEASUREMENTS

STAT NUMB	TIME CDT	WATER TEMP DEG C	CHLO PH A MG/M3	SALNTY PTS/K	AIR TEMP DG C	RELAT HUMDY PERCT	WIND DIR DEG	WIND SPD KN	SECM VISB FT	SEA STAT FT	CURRT KN	CUR DIR DEG	WATER DEPTH FT	BOTL NO.	REMARKS
E18	1245	30.8	3.1	28.22	31.7	61.6	240	8	5.0	2.0	.25	120	12.0	150	
E18	1456	31.0	*****	******	31.4	61.6	****	****	****	2.5	*****	***	12.0		
E19	1112	30.5	5.0	26.68	31.1	60.9	315	12	3.0	1.0	.21	120	9.0	136	
E19	1447	31.1	4.7	26.67	30.3	67.3	285	17	2.0	1.5	.30	190	9.0	134	
E20	1155	30.8	10.7	27.41	30.5	67.3	290	12	5.5	1.0	.16	120	12.0	131	
E20	1530	31.0	3.8	27.84	31.5	67.3	290	18	6.0	2.0	.21	310	12.0	129	
E21	1225	30.0	3.7	28.83	30.3	67.0	290	14	6.0	1.0	.25	180	11.0	133	
E21	1555	30.3	2.4	28.66	31.5	64.4	300	18	5.5	2.5	.30	286	11.0	25	
E22	1300	30.3	1.9	29.99	32.8	64.7	310	12	8.0	2.0	*****	***	*****	190	
E23	1235	29.8	1.2	******	32.5	64.7	310	12	>12.0	2.0	*****	***	*****	194	
E24	907	30.3	8.8	28.29	28.3	67.3	330	14	4.5	1.5	.21	120	10.0	17	
E25	954	29.6	8.4	26.89	29.8	67.0	320	14	3.5	1.5	.42	160	6.0	132	
E26	1044	30.2	11.7	25.11	30.2	64.1	315	8	3.0	.3	.21	180	7.0	138	
E24	1252	30.4	5.1	28.16	30.1	63.7	290	14	5.5	1.0	.21	360	10.0	130	
E25	1323	31.1	8.8	26.50	30.4	67.3	290	14	4.0	1.0	.16	140	7.0	19	
E26	1415	31.4	12.4	23.86	31.4	67.6	290	17	2.0	1.5	.19	40	7.0	137	

TABLE 2

MISSISSIPPI SOUND VI

FIELD AND LABORATORY MEASUREMENTS

STAT NUMB	TIME CDT	WATER TEMP DEG C	CHLO PH A MG/M3	SALNTY PTS/K	AIR TEMP DG C	RELAT HUMDY PERCT	WIND DIR DEG	WIND SPD KN	SECH VISB FT	SEA STAT FT	CURRT KN	CUR DIR DEG	WATER DEPTH FT	BOTL NO.	REMARKS
E27	1220	30.2	1.1	30.53	31.9	67.3	310 °	12	12.0	> 2.5	*****	***	*****	187	
0	1530	30.8	*****	.49	****	49.0	*****	****	****	*****	*****	***	*****		MISSISSIPPI TEST FACILITY TARGET POND (30°21'26.5"N 89°34'58.5"W)

APPENDIX I

MISSISSIPPI SOUND REMOTE SENSING STUDY PUBLICATIONS

1. Sea Remote Sensing Program, Mississippi Sound Remote Sensing Study, July 22, 1971, Surface Measurements.

2. Mississippi Sound Study, Part I Surface Measurements from Experiment II, November 10, 1971, Surface Measurements

3. Sea Remote Sensing Program, Mississippi Sound Remote Sensing Study, January 26, 1972, Report #010, Surface Measurements.

4. Sea Remote Sensing Program, Mississippi Sound Remote Sensing Study May 2 & 4, 1972 , Report #015, Surface Measurements.

5. Sea Remote Sensing Program, Mississippi Sound Remote Sensing Study July 6, 1972, Report #021, Surface Measurements.

6. Sea Remote Sensing Program, Mississippi Sound Remote Sensing Study July 6, 1972, Report #022, Remote Measurements Light Aircraft

7. Sea Remote Sensing Program, Mississippi Sound Remote Sensing Study July 11, 19, 25, and August 1, 1972, Report #023, Surface Measurements.

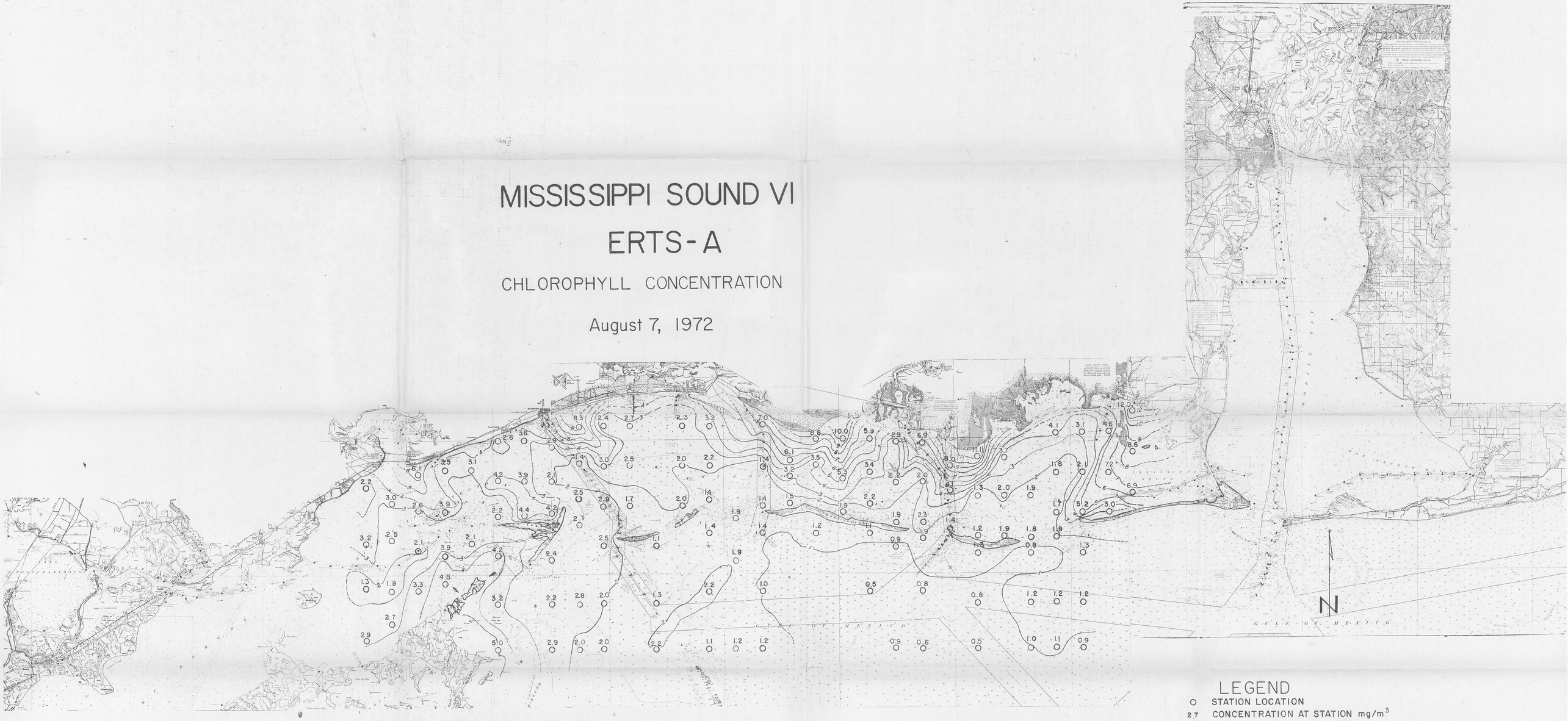
8. Atwell, B. H. and G. C. Thomann. Mississippi Sound Remote Sensing Study, NASA 4th. Annual Earth Resources Program Review, January 1972.

MISSISSIPPI SOUND VI

ERTS-A

CHLOROPHYLL CONCENTRATION

August 7, 1972



SCALE 1:250,000

5 0 5 10 15

NAUTICAL MILES

LEGEND

○ STATION LOCATION

2.7 CONCENTRATION AT STATION mg/m^3

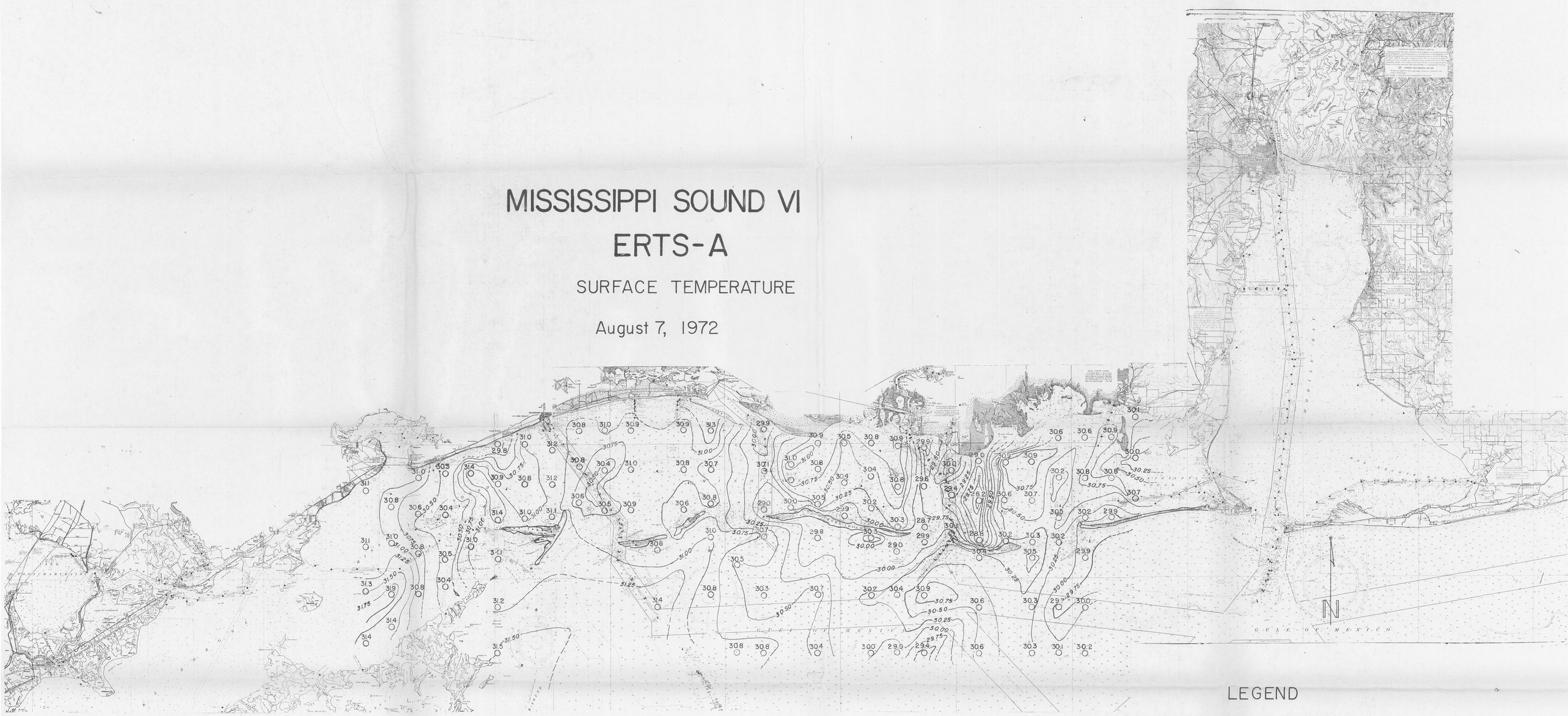
—3— CONTOUR INTERVAL $1 mg/m^3$

MISSISSIPPI SOUND VI

ERTS-A

SURFACE TEMPERATURE

August 7, 1972



SCALE 1:250,000

5 0 5 10 15

NAUTICAL MILES

LEGEND

o	STATION LOCATION
30.5	TEMPERATURE AT STATION
30.50	CONTOUR INTERVAL 0.25° C.
	(TEMPERATURE VALUES AT 1200 CDT)

MISSISSIPPI SOUND VI

ERTS-A

SALINITY CONCENTRATION

August 7, 1972

SCALE 1:250,000

5 0 5 10 15

NAUTICAL MILES

LEGEND

○ STATION LOCATION

30.5 CONCENTRATION AT STATION ‰

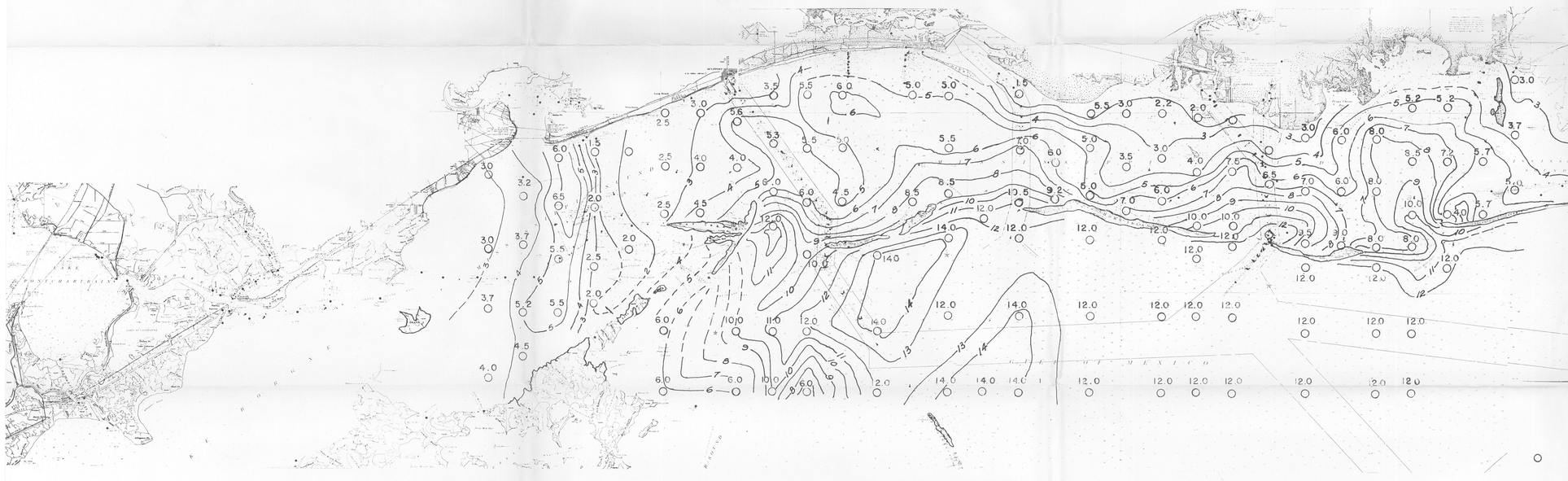
—30— CONTOUR INTERVAL 1 ‰

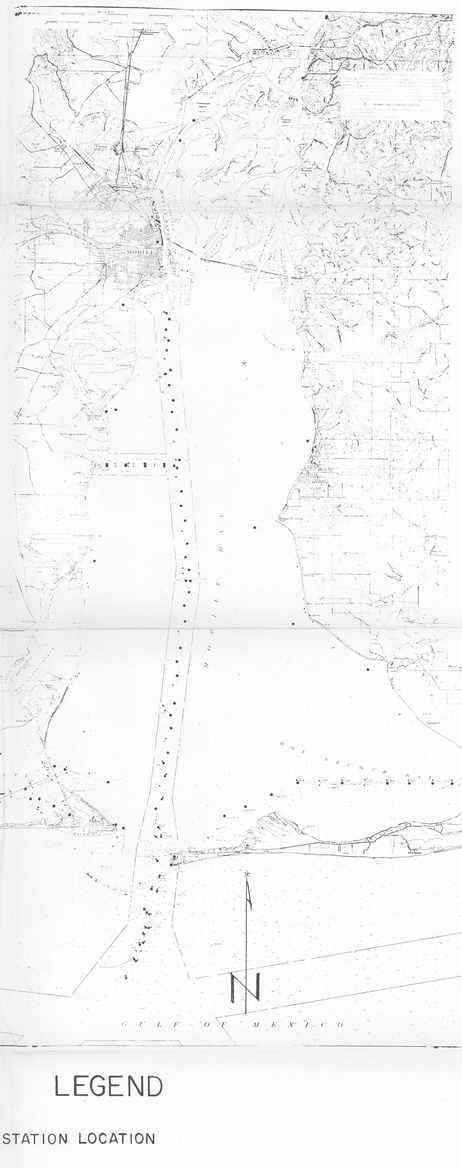
MISSISSIPPI SOUND VI

ERTS-A

SECCHI VISIBILITY

August 7, 1972





SCALE 1:250,000

5 0 5 10 15

NAUTICAL MILES

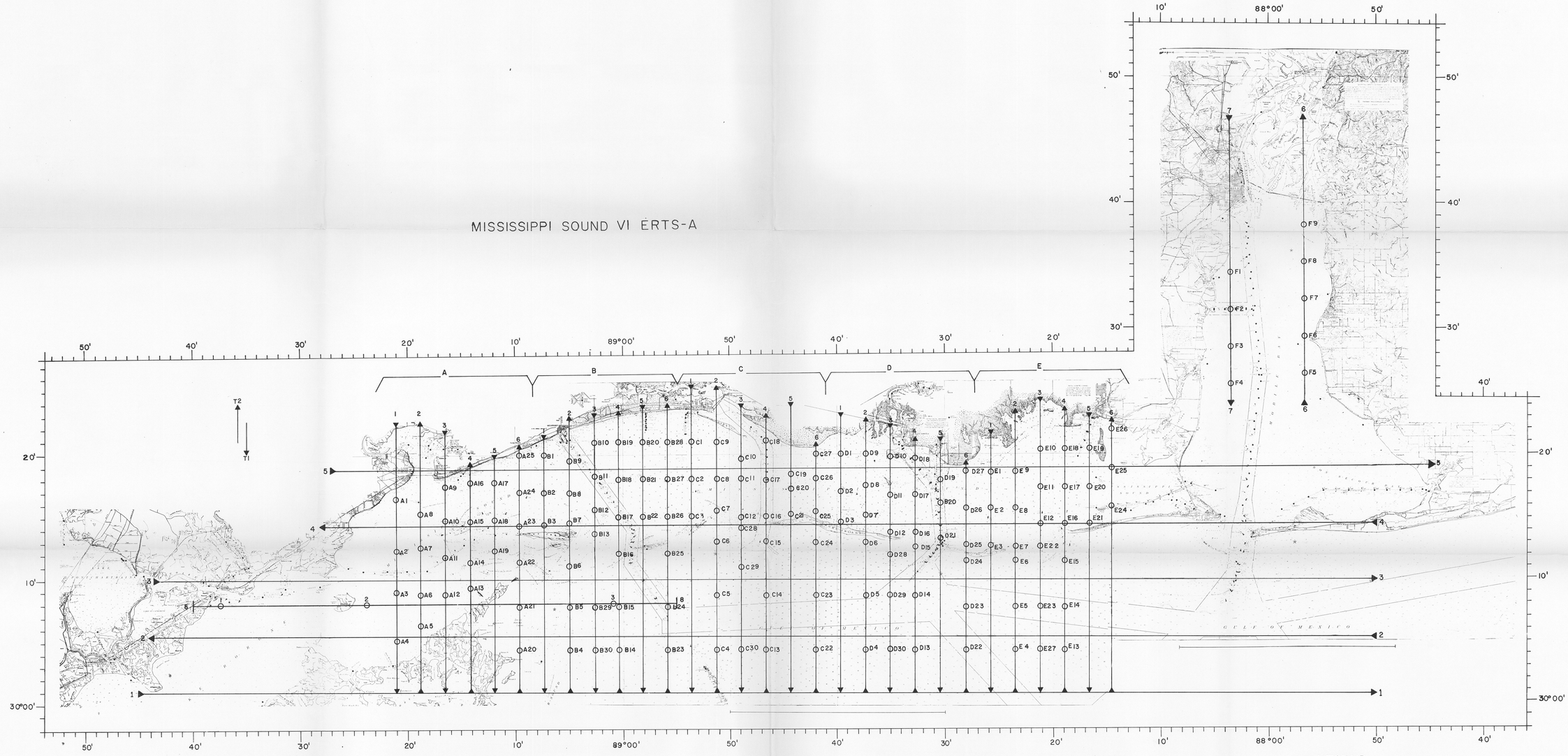
LEGEND

○ STATION LOCATION

52 VISIBILITY AT STATION

—5— CONTOUR INTERVAL IN FEET

MISSISSIPPI SOUND VI ERTS-A



LEGEND

LINES 1 THRU 7: NP3A 20,000'
SECTIONS A THRU E: NP3A 800'
SECTIONS A THRU E: TWIN BEECH 10,000'
LINE 8: NP3A 800'